



U.S. Department
of Transportation
**National Highway
Traffic Safety
Administration**

ODI RESUME

Investigation: EA 03-003
 Prompted By: PE02-046
 Date Opened: 04/09/2003 Date Closed: 03/03/2004
 Principal Investigator: SONNY MURIANKA
 Subject: OVERHEATING FRONT AND REAR BRAKES

Manufacturer: NEWMAR CORPORATION, WORKHORSE CUSTOM CHASSIS
 Products: NEWMAR RV - 2001-2002 EQUIPPED WITH BOSCH ZOPS BRAKE SYSTEM
 Population: 1832

Problem Description: ALLEGATION OF FRONT AND REAR BRAKE COMPONENTS
 OVERHEATING, CALIPER LOCK-UPS, SMOKE, BRAKE DRAG, AND/OR WHEEL FIRES.

FAILURE REPORT SUMMARY

	ODI	Manufacturer	Total
Complaints:	1	9	10
Crashes/Fires:	0	0	0
Injury Incidents:	0	0	0
# Injuries:	0	0	0
Fatality Incidents:	0	0	0
# Fatalities:	0	0	0
Other*:	0	0	0

*Description of Other:

Action: This investigation is closed. Appropriate recalls are being conducted by Newmar and Workhorse, who manufactured the majority of the involved chassis.

Engineer: Sonny Murianka *SM*

Date: 03/03/2004

Div. Chief: Richard Boyd

Date: 03/03/2004

Office Dir.: Kathleen C. DeMeter

Date: 03/03/2004

Summary: This investigation was derived from information gathered during PE02-046, Bosch disc brake calipers. This investigation focused on the vehicle manufacturer, Newmar. Subject vehicles were those built with a hydraulic brake system incorporating the Bosch Zero Offset Pin Slide (ZOPS) calipers. ODI's concern was excessive wheel end heat, possibly resulting in a wheel end fire. During the investigation, ODI discovered two specific Newmar vehicle models, those built on Newmar chassis and those built on a workhorse chassis.

As a result of the agency's investigation into this matter, all Newmar owners will be notified (04V-019) and the remedy will be applied to their vehicles. Some Newmar vehicles (1,795) built on the Workhorse chassis are being recalled by Workhorse (04V-084).

This investigation is closed. Further details are provided on pages 2, 3, and 4. Copies of both safety recalls are attached.

*MS
faxed on
3/5/04*

SUMMARY

Newmar reported that they produced 1,832 motor homes equipped with the subject ZOPS brake system. Of the 1,832 motor homes produced, 37 were built on Newmar's own chassis, called the Newco chassis, and the remaining 1,795 were built on a chassis produced by Workhorse Custom Chassis.

BACKGROUND

This investigation was opened in April 2003, as a result of information learned during three previous related investigations, PE02-046 (Bosch), EA02-034 (International medium duty trucks with Bosch ZOPS disc brake calipers) and EA02-035, Bosch Disc Brake Calipers.

All of these investigations have a shared history concerning wheel end overheating brake related problems on vehicles built with the Bosch ZOPS caliper. In 1997, Bosch started new production of their Zero Offset Pin Slide (ZOPS) disc brake caliper assembly. This new caliper incorporated an "environmentally sealed suspension" system to allow the caliper to slide laterally with less friction. The lubricated pins in the ZOPS assembly are sealed in accordion-shaped boots, designed to provide continuous free floating calipers requiring less maintenance and longer pad life. Sliding freely is critical since the actuating pistons within this caliper are not mounted on both sides of the caliper to clamp the rotor disc, but protrude from only one side. The clamping force on the other side of the caliper (outboard brake pad) is created from the reactionary force through the housing of the caliper. This new system, used by Bosch for years on lighter vehicles, replaced the standard medium-truck rail-slide disc brake design.

Some ZOPS calipers began to experience brake complaints shortly after introduction into the field. Bosch monitored the reports and formed Action Teams to inspect vehicles in the field and investigate why an advanced system, proven on smaller, lighter vehicles and in pre-production testing, was accumulating "failure to release" complaints from the field. Units were removed from complaint vehicles and collected for in-depth analysis. As more calipers were recovered from the field, the Bosch team identified numerous contributing causes. The resulting continuous improvements were incorporated into the ZOPS caliper production beginning in March 2001 (See Table – page 3). The ZOH-T caliper succeeded the ZOPS in June 2002 and incorporated all of the prior continuous improvement changes.

In June 2002, ODI opened its first investigation, a Preliminary Evaluation on Bosch, based on a complaint received from the owner of a 40-foot motor home. The owner alleged that repeated attempts had been made by the final stage manufacturer to correct problems that resulted in what he believed were increased stopping distances from severely overheating disc brake calipers. He also reported smoke and heat damage to the ABS sensor. During the Bosch PE, Monaco and Western RV both submitted safety defect reports to address these concerns. Although ODI initially focused only on recreational vehicles, it became apparent that other types of vehicles equipped with the ZOPS calipers were suffering similar problems. Thus, ODI opened the Engineering Analysis on International Truck Corporation in December 2002. On February 24, 2003, after meeting with ODI, International filed a safety defect report, (03V-062), to address concerns of calipers sticking in the partially applied position. International's defect report was supplemented in January 2004, with additional vehicles being included. Bosch subsequently filed a defect information report (03E-064) on December 16, 2003 and Workhorse filed a safety recall (04V-084) on February 18, 2004. The Workhorse recall covered a total of 9,040 RV's and included 1,795 chassis with a Newmar body. Newmar's defect report (04V-019) was applicable to vehicles built exclusively on the Newmar chassis, and the Workhorse recall addressed the remaining Newmar vehicles, not previously recalled, which were equipped with a Bosch ZOPS caliper. Prior to Workhorse's submission of the defect report, ODI had verbal discussions with Workhorse representatives and as ODI prepared to open an investigation on Workhorse, they decided, after reviewing their internal data, to conduct the safety recall.

That recall satisfies the concern which ODI had on the Workhorse chassis and also addresses remaining concerns for Newmar vehicles not yet recalled.

The following is a chronology of the various changes incorporated by Bosch into the ZOPS caliper that ODI believes are related to thermal events. "Thermal events" pertain to one or more wheel ends and may be reported as fire, burn, and/or smoke. Other symptoms are brake drag, and/or failure to release. Field reports and customer complaints may also mention pin failures, pin camming, and or poor caliper slide. We have included the date of the change, the purpose, and a brief description. Any problem which prevents the piston from fully retracting from the rotor would result in increased heat at that wheel end and depending on the amount of drag, ultimately, smoking, burning, and fire.

Date	Problem Category	Problem Detail	Fix Implemented
March 2001	Thermal events	Caliper not sliding on mounting pins	Improve pin grease distribution
April 2001	Broken/loose pin bolts	Poor joint integrity	Improve pin ear surface finish
April 2001	Thermal events	Rolled hydraulic seal during installation	Increase amount of piston seal lubricant
Oct 2001	Thermal events	Water intrusion and corrosion of caliper bore	Add BATCO grease to piston seal land
June 2002	Broken/loose pin bolts	Poor joint integrity	Bolt has longer, finer threads, shoulder, oil
June 2002	Thermal events	Water intrusion and corrosion of caliper bore	Increase piston boot squeeze
June 2002	Thermal events	Rolled hydraulic seal during installation	Wide piston seals & modify seal groove

Safety Risk

During ODI's investigations of vehicles with Bosch (ZOPS), disc brake calipers a multitude of manufacturers and vehicle types have been examined. In this particular investigation, the vehicles involved are recreational vehicles and ODI has taken the position that vehicles that transport multiple passengers and suffer overheated brakes and/or wheel end fires warrant a safety recall. ODI believes that recreational vehicles, as well as school buses, transit buses, emergency vehicles, ambulances and hazardous cargo carrying vehicles have a higher safety risk than other vehicles included in the investigations and also equipped with ZOPS calipers. The risk quantification stems from ODI's concern about vehicles with multiple passengers who would have to exit safely in the event of a wheel end fire. Vehicles with only a commercial driver with a CDL, who most likely would have a fire extinguisher in the vehicle, are generally at a lower risk.

Newmar reported that they produced 1,832 motor homes equipped with the subject ZOPS brake system. Of the 1,832 motor homes produced, 37 were built on Newmar's own chassis, called the Newco chassis, and the remaining 1,795 were built on a chassis produced by Workhorse Custom Chassis.

ODI believes the safety recall action taken by Newmar and Workhorse to remedy all the affected vehicles is an appropriate solution to this problem. Therefore, ODI is closing this investigation. ODI will continue to monitor this issue and if necessary take further action in the future. Copies of Newmar's and Workhorse's recalls are included in this file.

Other technical details are available to the reader by examining the closing report for EA02-035. Related test reports conducted on ZOPS calipers by the Vehicle Research and Test Center will be added to this file upon completion of the test report.

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Safety Defect and Noncompliance Report Guide for Vehicles **Part 573 Defect and Noncompliance Report**

On January 6, 2004, Newmar Corporation has determined a defect which relates to motor safety exists in the motor vehicles listed below, and is furnishing notification to the National Highway Traffic Administration in accordance with 49 CFR Part 573, Defect and Noncompliance Reports.

This report was prepared on January 6, 2004.

The manufacturer's identification number for this recall is _____

1. The "Final Stage" vehicle manufacturer is

Newmar Corporation
355 N Delaware St.
Nappanee, IN 46550

Company contact:

Betty Lehr
Warranty Recovery Manager
Consumer Affairs Dept.
(574) 773-7791
(574) 773-2007 fax

This report prepared by:

Jeff Christner
Compliance Engineer
(574) 773-7791
(574) 773-5153 fax

Signed Jeff Christner

2. Identify the Vehicles Involved in the Recall

The certain vehicles involved in the recall are model years 2001-2002 NewAire Class A Motorhomes.

3. Furnish the total number of vehicles recalled potentially containing the defect or non-compliance.

Model	2001	2002	Total
NewAire 2801	17	4	21
NewAire 2802	0	16	16
Grand Total	17	20	37

4. Furnish the approximate percentage of the total number of vehicles estimated to actually contain the defect or noncompliance.

97 % of the vehicles listed above contain the defect.

5. Describe the defect or non-compliance. The description should address the nature and physical location of the defect or non-compliance. Illustrations should be provided as appropriate.

The NewAire motorhome has been manufactured with Bosch ZOPS braking calipers and pads at each wheel, some of which have experienced failures with brakes dragging.

Describe the cause of the defect or noncompliance condition.

The ZOPS braking can develop a dragging of the pads on the rotor surface due to the pin slide not allowing the pads to retract away from the surface.

Describe the consequence(s) of the defect or noncompliance condition.

A hang up or lock up may cause the calipers to overheat and not allow the motorhome driver to stop safely.

Describe any warning which can (a) precede or (b) occur.

The brake pedal may become spongy and it may take more force on the pedal to stop the vehicle safely.

If the defect or noncompliance is in a component or assembly purchased from a supplier, identify the supplier by corporate name and address.

BOSCH, Robert Bosch Corporation Automotive Group.
401 North Bendix Drive
South Bend, IN 46628

Keith A. Kondratko
Director
Product Warranty
Chassis Division
(574) 237-5778

6. If defect, furnish a chronological summary with dates of all the principle events that were the basis for the determination of the defect. Include number of reports, accidents, injuries, fatalities, and warranty claims.

Newmar was made aware of an issue with ZOPS braking manufactured by Bosch, in a letter from NHTSA dated April 14, 2003. The letter from the Office of Defects Investigation stated an Engineering Analysis (EA03-003) to investigate allegations of overheated Bosch brake components in motor homes manufactured by Newmar.

Newmar reviewed warranty claim recorders and found no report of an accident, injuries, or fatalities. Due to a limited population of vehicles however, Newmar could not make a determination if the NewAire was affected by the Bosch brake component allegations.

On December 18, 2003, Newmar was informed by the Office of Defects Investigation that during an engineering analysis, NHTSA had determined Bosch's ZOPS braking components were defective and corrective action will be required.

7. If noncompliance, identify and provide the test results or other data in chronological order with dates on which the noncompliance was determined.

n/a

8. Furnish a description of the manufacturer's remedy for the defect or noncompliance. Clearly describe the differences between the recall condition and the remedy.

Remove and replace ZOPS calipers and brake pads and replace with ZOH-T calipers and brake pads.

Clearly describe the distinguishing characteristics of the remedy component/assembly versus the recalled component/assembly.

The ZOPS calipers have a solid pin slide and the ZOH-T calipers have a pin that is supported by a bushing on the trailing arm.

Identify and describe how and when the recall condition was corrected in production. If the production remedy was identical to the recall remedy in the field, so state. If the product was discontinued, so state.

The NewAire Class A Motor home has been discontinued.

Furnish a recall schedule or agenda, with specific dates, for notification to other manufacturers, dealers/retailers, and purchasers. Please identify any foreseeable problems with implementing this recall.

Newmar will plan to notify vehicle owners and dealers by February 27, 2004.

9. Furnish a final copy of all notices, bulletins, and other communications that relate directly to the defect or noncompliance and which are sent to more than one manufacturer, distributor, or purchaser. This includes all communications concerning this recall.

The manufacturer's campaign identification number if not identical to the number assigned by NHTSA.

Newmar's identification number will be assigned by NHTSA.

All Documents To Be Faxed To (202) 366-7882, Then Mailed.

04V-019

Safety Defect and Noncompliance Report Guide for Vehicles
Part 573 Defect and Noncompliance Report

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 355 N Delaware St.
 Nappanee, IN 46550

Company contact:

Betty Lehr
 Warranty Recovery Manager
 Consumer Affairs Dept.
 (574) 773-7791
 (574) 773-2007 fax

This report prepared by:

Jeff Christner
 Compliance Engineer
 (574) 773-7791
 (574) 773-5153 fax

Signed Jeff Christner

2. Identify the Vehicles Involved in the Recall

The certain vehicles involved in the recall are model years 2001-2002 NewAire Class A Motorhomes.

3. Furnish the total number of vehicles recalled potentially containing the defect or non-compliance.

Model	2001	2002	Total
NewAire 2801	17	4	21
NewAire 2802	0	16	16
Grand Total	17	20	37

4. Furnish the approximate percentage of the total number of vehicles estimated to actually contain the defect or noncompliance.

97 % of the vehicles listed above contain the defect.

5. Describe the defect or non-compliance. The description should address the nature and physical location of the defect or non-compliance. Illustrations should be provided as appropriate.

The NewAire motorhome has been manufactured with Bosch ZOPS braking calipers and pads at each wheel, some of which have experienced failures with brakes dragging.

Describe the cause of the defect or noncompliance condition.

The ZOPS braking can develop a dragging of the pads on the rotor surface due to the pin slide not allowing the pads to retract away from the surface.

Describe the consequence(s) of the defect or noncompliance condition.

A hang up or lock up may cause the calipers to overheat and not allow the motorhome driver to stop safely.

Describe any warning which can (a) precede or (b) occur.

The brake pedal may become spongy and it may take more force on the pedal to stop the vehicle safely.

If the defect or noncompliance is in a component or assembly purchased from a supplier, identify the supplier by corporate name and address.

**BOSCH, Robert Bosch Corporation Automotive Group.
401 North Bendix Drive
South Bend, IN 46628**

**Keith A. Kondratko
Director
Product Warranty
Chassis Division
(574) 237-5778**

6. If defect, furnish a chronological summary with dates of all the principle events that were the basis for the determination of the defect. Include number of reports, accidents, injuries, fatalities, and warranty claims.

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7. If noncompliance, identify and provide the test results or other data in chronological order with dates on which the noncompliance was determined.

n/a

8. Furnish a description of the manufacturer's remedy for the defect or noncompliance. Clearly describe the differences between the recall condition and the remedy.

Remove and replace ZOPS calipers and brake pads and replace with ZOH-T calipers and brake pads.

Clearly describe the distinguishing characteristics of the remedy component/assembly versus the recalled component/assembly.

The ZOPS calipers have a solid pin slide and the ZOH-T calipers have a pin that is supported by a bushing on the trailing arm.

Identify and describe how and when the recall condition was corrected in production. If the production remedy was identical to the recall remedy in the field, so state. If the product was discontinued, so state.

The NewAire Class A Motor home has been discontinued.

Furnish a recall schedule or agenda, with specific dates, for notification to other manufacturers, dealers/retailers, and purchasers. Please identify any foreseeable problems with implementing this recall.

Newmar will plan to notify vehicle owners and dealers by February 27, 2004.

9. Furnish a final copy of all notices, bulletins, and other communications that relate directly to the defect or noncompliance and which are sent to more than one manufacturer, distributor, or purchaser. This includes all communications concerning this recall.

The manufacturer's campaign identification number if not identical to the number assigned by NHTSA.

Newmar's identification number will be assigned by NHTSA.

All Documents To Be Faxed To (202) 366-7882, Then Mailed.



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MVS-215

2004 FEB 18 P 4:42

OFFICE OF
DEFECTS INVESTIGATION

February 18, 2004

Mr. Kenneth N. Weinstein
Associate Administrator for Enforcement
National Highway Traffic Safety Administration
400 Seventh Street, SW
Washington, DC 20590

Subject: Notice of Safety Defect Pursuant to 49 CFR Part 573

Dear Mr. Weinstein:

Workhorse Custom Chassis L.L.C. has decided that a defect which relates to motor vehicle safety exists in certain of their incomplete vehicle chassis and is furnishing notification to NHTSA in accordance with 49 CFR Part 573, Defects and Noncompliance Reports.

The defect exists in Workhorse Custom Chassis (Workhorse) incomplete Motorhome chassis manufactured with Bosch ZOPS brake calipers. All the incomplete Motorhome chassis were built between August 10, 2000 and June 29, 2002. Incomplete vehicle chassis manufactured after that date did not have the Bosch ZOPS brake calipers. Only W22 and W20 Workhorse incomplete Motorhome Chassis are affected by this defect. The defective part in question, the Bosch Zero Offset Pin Slide (ZOPS) was manufactured by Robert Bosch Corporation, 2800 South 25th Avenue, Broadview, Illinois 60155-4594.

Workhorse manufactured 9,040 vehicles with the Bosch ZOPS brake caliper. Workhorse believes that somewhere between 1 and 1.5% of its vehicles may contain the defect in question.

While the exact reason for the defect is still under investigation, it appears that the mobility of the slide in the caliper has been reduced or is subject to binding which leads to performance issues such as overheated brake components and potentially fire, burn, or smoke incidents. Workhorse is aware that NHTSA has discussed this issue with Bosch and has knowledge of the issue.

On July 11, 2002, NHTSA requested information from Workhorse regarding "alleged overheating front brakes resulting in increased stopping distances in vehicles manufactured or equipped with the Zero Offset Pin Slide (ZOPS) disk brake calipers manufactured by Robert Bosch Corporation." Workhorse responded to the Request for Information on August 26, 2002. At that time it was decided that the number of incidents involving the ZOPS brake calipers were



few in number and of little concern to Workhorse. Because Workhorse was aware that the investigation was continuing against Bosch and subsequently upgraded to an Engineering Analysis, Workhorse continued to monitor its warranty claims regarding the ZOPS brake calipers. Periodic review of the brake claims indicated that the numbers were increasing, but Workhorse believed that the numbers were still within an acceptable rate, based on the 0.5% rate communicated to Workhorse by NHTSA. In December 2003, the rates had increased to a level, where Workhorse believed that more extensive investigation was necessary. On January 15, 2004, detailed discussions were held with Richard Boyd, Office of Defect Investigations, and more information regarding the nature of the problem was learned. On February 11, 2003, the available information was presented to Dave Olsen, President of Workhorse, and he directed that a defect recall be conducted.

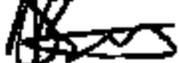
Workhorse intends to establish a program for remedying the defective ZOPS brake calipers in a procedure similar to that set forth by Bosch in their discussions with NHTSA. The exact date of sending out notifications is not known at this time, but we will notify you as soon as the date is determined.

Workhorse has been working with its customers during the time of the Bosch investigation. It believes that it has been providing reimbursement under warranty claims in those cases where problems with calipers have been raised. The brake calipers in question were under warranty, and that warranty is being honored by Workhorse.

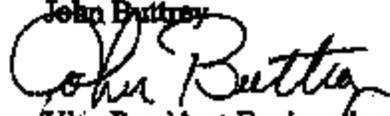
Copies of communications to dealers and customers will be provided to you shortly. Workhorse has assigned the following campaign number to this matter 50401-C.

Sincerely,

Dave Bagg


Certification and Compliance
(765) 964 2364

Concur:

John Buttrey

Vice President Engineering